Royal Horticultural Society

Sharing the best in Gardening

RHS Science

ISSUE 19 — MARCH 2014

Focus on the hidden garden for National Science Week

As part of National Science Week (15–23 March 2014), RHS Science mounted interactive microscope displays for visitors in the Glasshouse Gallery at Wisley.

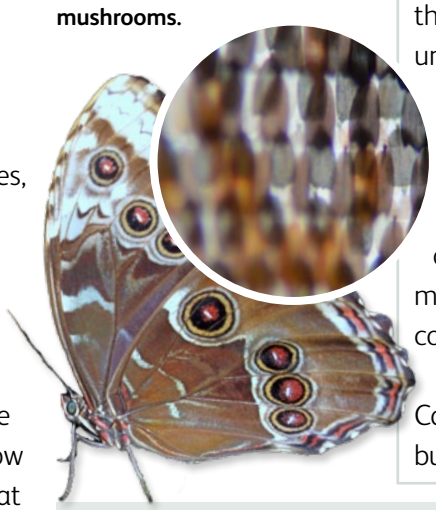
Publicised on Facebook, twitter and the National Science week website, the displays attracted around 1,500 visitors during the course of the event. As well as microscopes on desks, with which visitors could examine materials such as infected plant tissue, fungal spores, and nettle stinging hairs, high-power compound and dissecting microscopes were relayed live to a large overhead screen. These were then used to display various items, including butterfly wings, sticky hairs of carnivorous plants, nematode worms, and aphids predated by lacewing larvae.

"People were particularly interested in looking at familiar things under the microscopes, such as honeybees, shop-bought mushrooms, and the scales on butterfly wings," says Anna Platoni, Diagnostic Entomologist. "The exhibits attracted people of all ages. Children were excited to be allowed to use the microscopes, and many older visitors liked trying out equipment they hadn't seen since school."

The exhibits were accompanied by guidance notes, while RHS staff were on hand to give help and explain what people were seeing on screen. RHS Science will now be looking into the use of similar displays at future events. ■

PHOTOS: ANNA PLATONI EXCEPT BLUE MORPHO BUTTERFLY (KATY PRENTICE).

Above. **Microscope exhibits for Wisley visitors during National Science & Engineering Week, with** (inset) **a dissecting microscope linked to an overhead screen. This and a compound microscope were used to for live interactive displays. The most popular exhibits were familiar items such as butterfly wings** (below; click inset to zoom) **and the spores of shop-bought mushrooms.**



Survival of the flattest: Darwin's potato found at Wisley

A wild potato plant specimen collected by Charles Darwin during the voyage of HMS Beagle to South America in 1834 has been unearthed in Wisley Herbarium.

Herbarium Assistant Barry Phillips found the specimen during a search for other unrelated material. "The sheet said 'S. America, C. Darwin'. I looked online for scans of other Darwin specimens, and the format and handwriting were spot on. We haven't found any more of Darwin's collections yet, but we have many from the same period, and from collectors known to Darwin."

Cambridge University herbarium holds the bulk of the Beagle specimens. » p. 3

For more information about stories in this newsletter ▶ johndavid@rhs.org.uk

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News in brief

New webpages from Advisory. Around 50 new advice profiles have been posted on the RHS website in the last few months, including items on cacti and succulents, low maintenance gardening, millipedes, oleander, indoor palms, pond plants, rats, rhododendron leafhopper, rosy apple aphid, social wasps, wormcasts and native UK trees and shrubs. For the full range of Advisory profiles, go to apps.rhs.org.uk/advicesearch/AtoZ.aspx.

Garden index 2013. The index to *The Garden* is now available and will be downloadable once the new RHS website is launched. In the meantime, if you would like an electronic copy, contact compiler **Richard Sanford** (Horticultural Informatics).

John MacLeod Lecture. A video of the 2013 lecture, in which **Prof. Ken Thompson** of Sheffield University talked about invasive plants, can now be found on the RHS website at www.rhs.org.uk/Video/Science/video-on-lecture-about-invasive-plant-species.

Right. A new advice profile on *Hibiscus rosa-sinensis* has just been posted to the website.

News updates

Neonicotinoids withdrawal update. The period of grace for products containing imidacloprid, thiamethoxam, and thiamethoxam expired on 30 November 2013. Restrictions on the use of neonicotinoid products came into force after 30 September 2013, following concern over their effect on bees.

Following rejection of the proposed EU legislation on Plant Reproductive Material by both EU parliamentary committees, the draft Regulation was rejected by the EU Parliament by an overwhelming majority (650 no, 15 yes). The Regulation is to be considered by the Council of Ministers and is likely to be sent for major redrafting later in the year.

Ban on aquatic weeds. Defra's ban on the sale of five invasive aquatics comes into force in April 2014. The plants in question are *Azolla filiculoides*, *Crassula helmsii*, *Hydrocotyle ranunculoides*, *Ludwigia grandiflora* and *Myriophyllum aquaticum*. Retailers convicted of selling these plants could now face a 6-month prison sentence or a fine of £5,000.

HIBISCUS: RHS, LINDLEY LIBRARY.

Top Tens of pests and diseases for 2013 released

RHS Science has released its annual lists of the top ten UK pests and diseases, as reflected in enquries received from members during 2013.

Honey fungus was still the most common disease, while box blight continued to spread, with the highest number of cases reported so far in UK gardens. Following a wet spring, blossom wilt reappeared in the top 15 diseases. *Phytophthora austrocedri*, a threat to junipers and other *Cupressaceae*, maintained its presence in gardens.

As in 2012, slugs and snails topped the list of pests; in fourth place, mice and voles had their highest number of enquiries in almost a quarter-century. A newcomer to the top ten, in 8th place, was plum moth (*Grapholita funebrana*, right). The caterpillars attack plums and other fruit, entering at the stalk and feeding around the stone.


RHS ENTOMOLOGY

Darwin's potato, cont.

« p. 1 Wisley's example, which shows leaves and flowers, was part of a consignment sent back to Darwin's mentor at Cambridge, John Stevens Henslow, and came to Wisley when Henslow's son George (RHS Professor of Botany 1880–1918) donated his herbarium to the RHS. It was collected in the Chonos Archipelago, and is mentioned in Darwin's account of the voyage. Darwin says of the wild potato, "The tubers were generally small, but I found one, of an oval shape, two inches in diameter: they resembled...English potatoes; but when boiled they shrunk much, and were watery and insipid, without any bitter taste". Says Barry, "It was originally named *Solanum tuberosum*; however, the plant was grown at Kew for 20 years side by side with *S. tuberosum* and still retained its individuality, so in the *Journal of the Linnean Society* (1884) it was named *Solanum maglia*. But it has been shifted again and is now *S. tuberosum* var. *vulgare*."

Right. Archipelago de los Chonos, where Darwin collected the specimen.

In December, after a viva lasting over 4 hours, **Geoff Denton** (left) was awarded his PhD from Imperial College London.

Titled "The role and diversity of *Pythium* and *Phytophthora* in UK gardens", the work included a survey (2006–2009) of advisory enquiries about plants with root rot and stem lesions, with the aim of identifying the potential causal organisms. Plant pathogenic species of both *Phytophthora* and *Pythium* were detected, including some species new to science. Geoff's research will considerably strengthen the advice we give to gardeners about two pathogens for which no chemical controls for home gardeners presently exist.

PHOTO. GARDEN MEDIA GUILD.

Advisor pots media award

RHS Science added to its collection of garden-writing silverware at the end of last year with another success in the Garden Media Guild awards.

Following on from James Armitage and Leigh Hunt in previous years, Advisory's **Guy Barter** (above, centre) won the Practical Journalist of the Year award for three *Garden* articles on root cuttings, growing media for containers, and fungal diseases.

Speaking after the event, Guy said, "I am very well aware that I can only do what I do because I have the support of colleagues in Wisley as well as Peterborough and London, whose skill and knowledge I shamelessly plunder."

Guy beat off strong competition to win the award, with the other nominees including Toby Buckland, Sue Strickland and plantsman Bob Brown of Cotswold Garden Flowers.

Urban trees and air pollution research

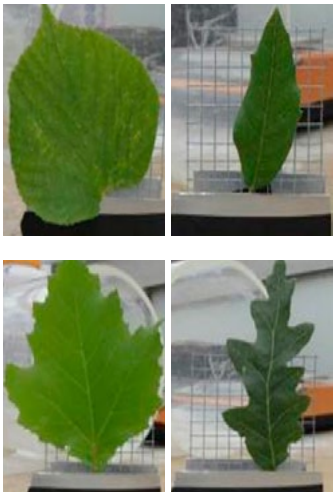
Since October 2010, RHS has been involved in research into the role of urban trees in the removal of particulate air pollutants, through **Federica Fantozzi**'s PhD project at the University of Siena, co-supervised by **Tijana Blanusa**. Federica successfully passed her viva and was awarded a PhD in December 2013.

Two core questions were investigated within the project:

- How do different plant species compare in their ability to intercept and retain airborne particulate matter?
- To what extent does holm oak (*Quercus ilex*) influence atmospheric concentrations of heavy metals, and also gaseous pollutants O_3 and NO_2?

The results suggest that the species used (holm and Turkey oak, London plane, lime and olive) differ markedly in the extent to which they capture particulate pollutants. Species with rougher and / or hairier leaves capture more particles; thus London plane and holm oak were the top performers. Through the deposition of particles (including heavy metals) on leaves, followed by the formation of leaf litter, holm oak was found to increase the soil's ability to bind metals, decreasing their bioavailability for further transfer. Moreover, the presence of holm oak reduced the concentration of NO_2 in all seasons of the year, though its influence on O_3 concentrations was less consistent.

One paper has already been published from this project (2013), and two further are planned for 2014. It forms part of the RHS's ecosystem services research, which aims at understanding how differences in plant structure, function and management can be used to get the most environmental benefit out of our green spaces.



Clockwise from top left. **Leaves of lime, holm oak, Turkey oak and London plane were held upright while salt solutions (as aerosol) or talcum powder particles were directed onto them in a wind tunnel to assess how many particles they captured.**

PHOTOS: FEDERICA FANTOZZI (URBAN TREES RESEARCH), GEORGI MABEE (PLANTS FOR BUGS).

Plants for Bugs: results preview day

In March a Plants for Bugs day was held at Wisley, in conjunction with the Wildlife Gardening Forum.

The event was aimed at gardeners interested in the scientific work behind wildlife gardening and the role of native and non-native plantings. The day included descriptions of the sampling techniques employed during the project, as well as explanations of the methodology involved. A brief summary was also given of the invertebrates collected from the P4B plots. These now amount to 80,000 specimens from more than 400 species.

The results are expected to show that for some invertebrate groups, significant differences in invertebrate diversity and abundance exist between different plantings, but that there are differences in preferences between invertebrate groups, with some groups showing no preferences at all. The clearest examples occurred among the flower-visiting insects, where social bees appeared to prefer near-native plots, while hoverflies preferred native. However, the results are at a very early stage of analysis; a number of complex interactions require further statistical testing before firm conclusions can be drawn.

Above (click to zoom). **During the project nectar samples were analysed for constituent sugars (glucose, fructose and sucrose). The results will help the RHS provide advice on best plantings for pollinators.**

The first results paper, on the pollinating insects, is due for submission in summer 2014. Interpretation for the gardener will follow. ■

2013 RHS gardens weather reports

by John David

CHIEF SCIENTIST

THE FIRST HALF OF 2013 was characterised by a sustained cold spring, which lasted well into April. This was caused by a high pressure system over Scandinavia which remained in place for over three months, bringing cold arctic air across the UK.

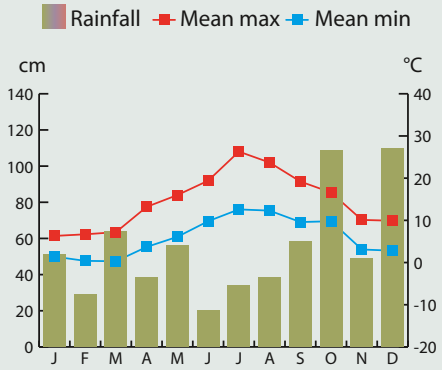
While this did not bring any exceptional minimum temperatures (the lowest at Wisley was -8.2°C, and at Harlow Carr -9.4°C, both in January), daytime maximum temperatures were well below average during February and March. The temperature returned to near normal in the second half of April at Wisley, although the weather remained on the cool side well into June. Sunshine levels during the first half of the year were generally below average due to persistent cloudiness, although perversely, rainfall was also below average.

The summer saw a distinct change, with a warmer summer than average. At Wisley both July and August saw maximum temperatures over 30°C, with 33°C being recorded on 23rd July and 32.4°C on 2nd August, both well short of the all-time records of 36.5°C (July 2006) and 37.8°C (August 2003); 28.3°C and 27°C were the recorded maxima at Harlow Carr for July and August respectively. This spell of warm weather continued into September, with 29°C recorded on the 6th during the Wisley Flower Show. The weather then broke, and the rest of September saw the return of cooler, wetter conditions, with Harlow Carr recording its first frost (-1.1°C) on the 8th. October was relatively mild (neither Wisley nor Harlow Carr recorded any frost) but on 28th the UK was struck by the St Jude's storm, which caused extensive damage in southern England, although relatively little occurred at Wisley, despite a gust speed of 46.5mph being recorded.

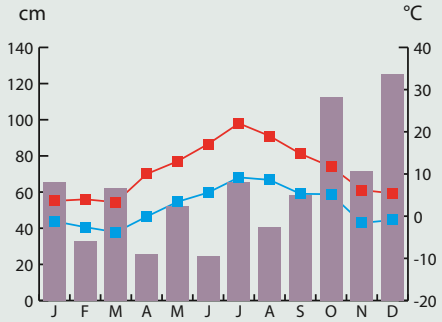
A brief cold snap set in in November, with Wisley recording its first frost on the 10th and with minima of -3.9°C on the 19th at Wisley and -6.7°C at Harlow Carr on the 23rd. December saw a return to warmer but much more stormy conditions, culminating in the Christmas Eve storm which resulted in a record 24hr total of 41mm (1.6 inches) rain at Wisley. Despite slightly lower wind speeds (maximum gust speed of 42mph) it caused major damage at Wisley blowing down three champion trees in the garden. Rainfall was well above average for both October and December (108mm and 110mm at Wisley; 112mm and 125mm at Harlow Carr; 110mm and 88mm at Hyde Hall, respectively). In December Wisley had 70% above average rainfall, and Harlow Carr was 45% above average. ■

RHS weather data

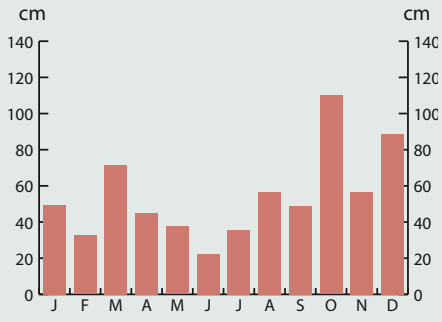
SOURCE. Data collected in RHS Gardens weather stations, 2013. Temperature data not available for Hyde Hall. Rosemoor weather station was offline for most of 2013. Mouse over charts to zoom.



Wisley



Harlow Carr



Hyde Hall

In January 2014, Wisley recorded 150.8mm of rain, a new record for the month, surpassing the 130mm of 1995. It was not the wettest month ever recorded, however: that was October 2000, with 191mm of rain.

PHOTOS: BARRY PHILLIPS (ANEMOMETER), CAROL SHEPPARD.

Background. **Wisley's anemometer, which stands near Fruit.**

From plot to plate: the Secret Garden Sunday

by Tony Dickerson

ADVISORY

PHOTOS: TIM SANDALL EXCEPT TONY DICKERSON (BOB MARTIN).

Secret Garden Sundays are a special new series of events from the RHS to get Londoners growing, eating and celebrating the best of seasonal British produce in 2014. SGS take place on the first Sunday of every month from April to September with a Christmas Special on 2 November in the Lindley Hall, Vincent Square.

Secret Garden Sundays run from April till the end of September. The intention is to create a wide visitor appeal through horticultural and local food content. SGS will also promote RHS initiatives and themes such as the RHS Science strategy, Campaign for School Gardening, Grow Your Own, Britain in Bloom and Big Wildlife Gardening Week.

As well as existing RHS members, the shows are intended to attract a new demographic: young (25–35), urban, beginner gardeners who have lots of enthusiasm but not much experience – our members of the future.

The emphasis will be on horticulture and gardening, including gardening demos and have-a-go sessions from Hort Advisory and Curatorial staff, but with a much greater range of other activities, including botanical art, flower arranging, music and performance artists as well as talks and displays from specialist nurseries and societies.

Hort Advisory will be playing a key role with "what you should be doing now" advice and the Growing Together club – a return plant clinic, starting off with chilli seedlings to pot up and take away in April and concluding with orchid care in November. ■

New season of talks for staff at Wisley

IN A FURTHER DEVELOPMENT FOR 2014, Hort Advisory co-ordinated 20 talks on topics of common interest for Science, Curatorial and Horticulture staff.

The typical format involved two short presentations on a common theme by two speakers. The series began with **Mark Heath** (Hort Relations) looking at the background and rationale of plant trials, while **Amy Rayner** from Curatorial addressed some of the practical issues in managing the programme. In the last talk, at the end of March, **Tijana Blanusa** (Plant Soil Interactions) and **Alexis Pym** (Education & Learning) looked at research and case studies on greening our landscapes.

Said organiser Tony Dickerson, "By bringing together people working on similar activities in different ways, we strengthen our knowledge and understanding of each other's work and the problems we face."

If you are interested in giving a short presentation (typically 15–20 minutes) in any future programmes of talks, please contact **Tony Dickerson**.

Over the garden wall: RHS Science and Facebook

Advisory's **Rebekah Mealey** gives an insight into the world of professional posting

Welcome to the virtual world of social media: first stop Facebook. Please feel free to Like, Share and Comment, but "don't feed the trolls".

Like other organisations, the RHS uses Facebook as a marketing tool to promote its work, so this is where I promote Science & Advice. The topics are inspired by the work that goes on in the Science & Advice teams, from interesting samples from members to our latest scientific research.

I try to entice our followers to look at our posts with pictures of plants and tongue-in-cheek humour, and encourage them to get involved by asking questions. In every post I try to include a link to our webpage, driving traffic to advisory profiles and RHS Plant Selector. The trick is to pre-empt a situation so that your advice is timely and useful. Followers often favour pretty plant profiles and wildlife information over the serious topics about garden ailments, but they are generally responsive and appreciate the information given. It's always very satisfying to get 475 likes and even nicer to be shared.

The aim is to continue to grow and develop with our audience, to help them with their gardening queries, to learn from their answers, and for them to Follow, Like, Share and Comment even more. Currently nearly 5m people worldwide have gardening as an interest on their Facebook profile – wouldn't it be wonderful if every one of them followed the RHS. ■

GREEN GARDEN

Save the planet in your garden

Seven signs to save the planet: new revelations at Wisley

Seven "Green Garden" interpretation panels have been installed in the Family and Enthusiasts' Model Garden at Wisley, to explain the science behind the benefits plants provide in our towns and cities.

The panels were written by **Tijana Blanusa** and **Leigh Hunt** from RHS Science, and designed by Interpretation's Josh Bailey. Each panel focuses on a different garden feature or group of plants, and is intended to reveal the hidden environmental benefits, from the range of eco-systems services trees provide to the use of hedges to trap pollutants.

Says Advisory's Leigh Hunt, "The take-home message for visitors is simple: this is what plants are doing in your garden, and these benefits are available simply by growing them." ■

Third Annual RHS PhD Symposium

Over 60 students, supervisors, RHS staff and invited scientists from 11 institutions attended the latest PhD Symposium at Wisley. The event is primarily aimed at giving our PhD students an opportunity to hone their presentation skills in front of a supportive and friendly audience. The talks reflected RHS research interests, including grassless lawns, *Pythium* and woody plants, the impact of ivy on building integrity and the effects of native or non-native plants on soil biodiversity.

The day also included presentations by students from East Malling Research, Harper Adams University, the John Innes Centre, Royal Holloway College and the James Hutton Institute. Said Paul Alexander, who organised the event, "Being exposed to such a variety of topics will help students appreciate the breadth of horticultural research being undertaken in the UK."

The day finished with a presentation from Dr Ross Cameron (University of Sheffield), who outlined the demands on horticultural research as our understanding of climate change develops.

Recent publications by Science staff

Ardle, J. & Salisbury, A. (2014). Stemming the tide. RHS Science update. *The Garden*. **139 (4)**: 54–58.

Armitage, J.D. (2014). Revising the *Hillier Manual*. *The Plantsman* **13(1)**: 46–49.

Armitage, J.D. (2014). Book review: *Euonymus, een kleurrijk geslacht*, by Piet de Jong and Henry Kolster. *The Plantsman* **13(1)**: 64.

Blanusa, T. & Hunt, L. (2013). Urban vegetation: truths, uncertainties and misconceptions. *The Plantsman* **12(4)**: 232–235.

Denness, A., **Armitage, J.D.** & Culham, A. (2013). A contribution towards the identification of the giant hogweed species (*Heracleum*, *Apiaceae*) naturalised in the British Isles. *New Journal of Botany* **3(3)**: 183–196.

Dickerson, T. (2014). RHS Masterclass: Making Compost. *The Garden* **139(2)**: 64–68.

Halstead, A. (2012). Hemerocallis gall midge study. *The Daylily Journal* Winter 2012: 18–20.

Henricot, B. and Waghorn, I. (2014). First report of collar and root rot caused by *Phytophthora hedraiandra* on *Viburnum* in the UK. *New Disease Reports* **29**: 8.

Leslie, A. (2013). *The International Dianthus Register (1983) & Checklist*. 30th supplement.

Leslie, A. (2013). *The International Rhododendron Register & Checklist (2004)*. 8th supplement.

Malumphy, C. & **Halstead, A.** (2013). Two mealybug species on *Alchemilla mollis*. *British Journal of Entomology and Natural History* **26**: 240.

Malumphy, C. & **Salisbury, A.** (2014). First incursion of manuka felt scale *Acanthococcus mariannae* in Britain. *British Journal of Entomology and Natural History* **27**: 21–24.

McDonald, S. (2014). Daffodils of Distinction. *The Garden* **139(3)**: 40–46.

Salisbury, A. (2014). Slugs and snails. Problem solver. *The Garden*. **139(4)**: 66–67.

Salisbury, A., Malumphy, C. **& Halstead, A.J.** (2013). Euonymus scale, *Unaspis euonymi* (Comstock) (*Hemiptera*: *Diaspididae*); an introduced pest of spindle (*Euonymus*) in Britain. *British Journal of Entomology and Natural History* **26**: 211–217.

Salisbury, A. & Platoni, A. (2013). The green dock beetle, *Gastrophysa viridula* (De Geer, 1775) (*Chrysomelidae*); a pest on *Begonia* (*Begoniaceae*), a new host record. *The Coleopterist* **22**: 124–125.

Shaw, J.M.H. (2013). X marks the spot. In: *20th World Conference, Singapore 2011* (ed. J. Elliott *et al.*).

Shaw, J.M.H. (2013). An annotated list of hybrid genera involving *Vanda*. *Renziana* **3**: 92–93, S1–29.

Shaw, J.M.H. (2013). Some liliaceous plants from China and Vietnam. *Lilies and related plants 2013–2014*: 26–34.

Shaw, J.M.H. (2014). Peter Francis Hunt, obituary. *Orchid Review* **122(1305)**: 12.

Shaw, J.M.H. (2014). Hybrids between *Dichroa* and *Hydrangea*. *The Plantsman* **13(1)**: 16–21.

RHS Science in the media

- **Guy Barter** appeared on ITV London Tonight in February, offering advice on how gardeners should manage food contaminated by flood water. The broadcast was filmed at RHS Garden Wisley.
- **Jenny Bowden** advised Evening Standard readers on the problems of saturated soil, following the prolonged wet conditions, and also answered readers' letters online.
- **Janet Cubey** was interviewed by the Daily Telegraph on the subject of the new *Hillier Manual* and *RHS Plant Finder*.
- **Paul Alexander** appeared on BBC One Breakfast, BBC Online, and BBC Radio 4's PM programme, encouraging gardeners to use alternatives to peat.
- **Anna Platoni** (right) was interviewed on the ITV London weather report (19 Feb) on the subject of farmland butterflies. She also talked to BBC Radio Surrey about the 2013 Top Ten pests.

PHOTO: ANNA PLATONI.

- **Andy Salisbury** was interviewed by the Daily Mail about plum moth.
- **Nicola Bristow** and **Laurel Emms** answered readers' questions in the Woman's Weekly spring special.

For more information on any stories in this newsletter:

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